



# INTERNAL AUDIT CONTROLS EVALUATION METER REPLACEMENT

October 1, 2001

Roanoke City Council Audit Committee  
Roanoke, Virginia

We have audited the Meter Replacement Program in accordance with government auditing standards.

## **BACKGROUND**

The Meter Shop is an operational unit of the Utilities Department. The primary responsibilities of the Meter Shop are responding to problems with water meters and providing 24-hour service for broken consumer water lines, turn-off services, frozen services, defective meter removal, 10 year meter removal, and investigations for consumption problems. The Meter Shop maintains the accuracy of all water meters from 5/8" to 10" by testing, repairing, and replacing them.

During 1996, the Meter Shop initiated a program to replace approximately 5,000 small meters each year. The program was expected to last seven years and replace all 36,000 small meters in use throughout the City. The small meters will then be placed on a 10 year replacement cycle. In addition, a large replacement program provides for the replacement of 26 large meters per year. This allows for a 50 year replacement cycle on large meters.

The purpose of the replacement program is to ensure that old, slow, or obsolete meters are replaced to provide accurate utility billing to the City. If the meters are not replaced at the end of their serviceable life, the City could potentially lose significant water revenue. The revenue loss is compounded by the lost sewer billing revenue and utility taxes which are also determined based on the consumers water consumption. These revenues account for 11% (or \$21 million) of the City's annual revenue. Budgeted revenues from external customers for fiscal year ending June 30, 2002 are as follows:

- Charges for Water Services \$ 9,884,278
- Charges for Sewer Services \$10,444,745
- Utility taxes for water \$ 950,000

In order to achieve the objectives of the replacement program, the Meter Shop uses two different procedures to replace meters. First, meters are systematically replaced opposite of meter reading routes as staff time permits. This process is used because it efficiently replaces large quantities of meters without disrupting the work of the meter reading staff. Second, malfunctioning meters of replacement age are replaced instead

of being repaired. The meters are replaced because the cost of new meters is typically less than the cost to repair them. The American Water Works Association recommends replacing small meters between seven and twenty years depending on the conditions at the locality.

## **PURPOSE**

To determine whether a system of internal controls is in place to ensure that the objectives of the meter replacement program are achieved.

## **METHODOLOGY**

We obtained an understanding of internal controls relating to the meter replacement program by reviewing available documentation, reviewing prior audit recommendations, and interviewing Meter Shop personnel. We documented our understanding by developing data flow diagrams and process narratives. Based on these narratives, we identified controls and the risks involved in the area of meter replacement. We evaluated the efficiency and effectiveness of the controls over the risks. As a result of our evaluation, we developed a test program that includes a combination of substantive and control test work. Sampling was performed on a non-statistical basis due to data configuration and accessibility.

## **SCOPE**

We audited the internal controls over the meter replacement program as of June 30, 2001. Transactions involving water meters from September 1, 1999 until June 30, 2001 were tested.

## **RESULTS**

- We analyzed 100% of the work orders documented in the HTE work order processing system to identify concentrations of meter replacements. We judgmentally selected 50 work orders from the concentrations identified, and we cross referenced location codes on the work orders to City addresses. The test work indicated that the processes employed to replace meters in bulk quantities are adhered to.
- Using interval sampling, we selected a total of 50 work orders from documentation obtained from the HTE work order processing system in order to determine whether small meters are being replaced instead of repaired. The test work indicated that the meters requiring repair service are replaced, which is consistent with the philosophy adopted in the replacement program.
- We judgmentally selected a stratified sample of 30 water meters with a high occurrence of service requests. We examined the nature of all work requests issued for each meter to determine whether replacement of the meter was required. The test work indicated that meters with a high occurrence of service requests were properly replaced. Auditing will review the nature of work orders with a high occurrence of service requests in an upcoming work order processing audit to evaluate the process employed to complete these work orders.

- We determined the number of meters replaced on the replacement program using the HTE work order processing system. We noted that over a 4-1/2 year period, approximately 19,557 small meters and 170 large meters have been replaced. To date, the meter shop has not achieved its goal of replacing 5,000 small meters each year. They have averaged changing approximately 4,300 meters per year, and the small meter program is currently less than 1 year behind schedule. They are, however, on schedule to complete the program before the first meters installed on the program reach replacement age. The meter shop is exceeding the large meter program's goal of replacing fourteen 1-1/2 - 2" meters and twelve 3" and larger meters per year.

**CONCLUSION**

At June 30, 2001, a system of internal controls was in place to ensure that the objectives of the meter replacement program are achieved.

We would like to thank the Utilities' staff members for their cooperation during the audit.

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